Electronic Miniaturization for Missile Applications (EMMA) Program

Status: Transition

PROBLEM / OBJECTIVE

The Electronic Miniaturization for Missile Applications (EMMA) Program was initiated to introduce commercial advanced electronic packaging to an existing guided missile design. The program's mission was to identify, evaluate, and mitigate the risks associated with integrating miniaturized commercial-off-the-shelf (COTS) electronic packaging technologies into military guided missile systems. The program was initiated in March, 1999, with its completion in January, 2002.

The first EMMA program deliverable was to introduce commercial advanced electronic packaging technologies to an existing guided missile design. The program's demonstration vehicle was Raytheon's Standard Missile (Figure 1). The second EMMA Program deliverable was the creation of the Technical Applications Guidelines (TAG) Handbook. The handbook's objective is to provide Government and Industry personnel with information concerning the introduction of COTS advanced electronic packaging to a high reliability environment.

ACCOMPLISHMENTS / PAYOFF

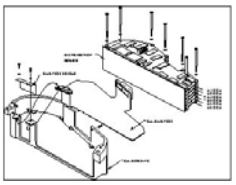
Process Improvement:

The Standard Missile Electronics Assembly Unit (EAU) utilized 20-year-old technology in several of its systems. The EAU required six- (6) 1980 vintage printed through hole (PTH) technology circuit cards. Implementing COTS advanced electronic packaging reduced the assembly's volume by over 80% by integrating state-of-the-art Surface Mount Technology (SMT) into the design (Figure 2). This reduction in volume allows for the insertion of additional mission capabilities. The EAU, developed from data generated by the EMMA Program, became a single double-sided circuit card employing fine pitch surface mount technology and advanced packaging technology. This reduced manufacturing costs by 65%. It is estimated that that the unit costs realized from the EMMA Program results in a cost avoidance of $ 10.5 M over 6 years. The new design is more reliable than its predecessor, with a projected 50% increase in its Mean Time Before Failure (MTBF).

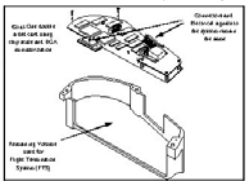
Implementation and Technology Transfer:

By pro-actively implementing COTS technology to the EAU, potential sustainment issues due to component obsolescence were resolved. These goals were met without compromising the design's functionality, the system's reliability or its manufacturability. The new EAU design is interchangeable with its predecessor, an important feature to meet the Standard Missile Program sustainment requirements.

Current Electronics Assembly Configuration



New Electronics Assembly Configuration

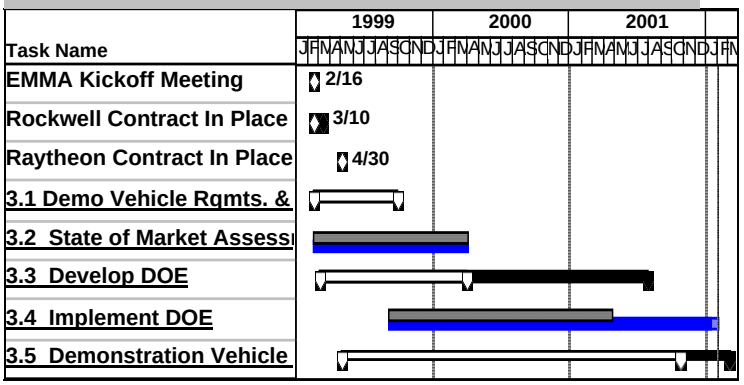


Standard Missile Electronics Assembly

Expected Benefits:

The Technical Applications Guidelines (TAG) Handbook's intention is to serve as a technical resource that documents the design, manufacturing, and reliability concerns encountered during the program. The handbook offers suggestions on how to introduce these technologies into hostile environments and provides lessons learned from the program's experience.

TIME LINE / MILESTONE



FUNDING

ManTech Funded	
Navy:	$ 6.2 M
Army:	$ 0.2 M
Total Funding	**$ 6.4 M**
Leverage Funded	
Raytheon Support	$ 5.9M
Rockwell Collins Support	$ 5.1M
AMCOM Program Support	$ 1.8M
Equipment Manufacturers	$ 0.5M
Total Leverage Funding	**$ 13.3M**

PARTICIPANTS

COE EMPF; Philadelphia, Pennsylvania
Raytheon; Tucson, Arizona and McKinney, Texas
Rockwell Collins; Cedar Rapids, Iowa
Naval Surface Warfare Center - Crane; Crane, Indiana
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